Intel® Pentium® III Processor Performance Brief

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EXECUTIVE SUMMARY: THE INTEL® PENTIUM® III PROCESSOR

The Intel® Pentium® III processor, Intel's most advanced and powerful processor for desktop PCs, introduces several new features for maximum performance, productivity, and manageability. For users who interact with the Internet or work with data-rich media applications, the most important advancements are the Pentium III processor's Streaming SIMD Extensions—70 new instructions that dramatically enhance the performance and possibilities of advanced imaging, 3D, streaming audio, video, and speech-recognition applications. With all the power needed for the next generation of Internet-enabled software, Pentium III processors will continue to deliver an exceptional experience for PC users well into the future.

The Intel Pentium III processor delivers excellent performance for all PC software and is fully compatible with existing Intel Architecture-based software. The Pentium III processor at 500 and 450 MHz extends processing power further by offering performance headroom for business media, communication, and Internet capabilities. Software designed for the Pentium III processor unleashes its full multimedia capabilities including full-screen, full-motion video, realistic graphics, and an enhanced, exciting Internet experience. Systems based on Pentium III processors also include the latest features to simplify system management and lower the total cost of ownership for large and small business environments. The Pentium III processor offers great performance for today's and tomorrow's applications, as well as the quality, reliability, and compatibility you have come to expect from the world's leading microprocessor company.

Today's microprocessors are used to run a broad range of software applications. Multimedia, 3D, and Internet application use has increased sharply over the past few years, and this trend is anticipated to continue in the future. For this reason, a wide range of benchmarks should be considered when evaluating processor and system performance. PC users and buyers should consider the entire Spectrum of Performance, which includes productivity, multimedia, 3D, and Internet performance.

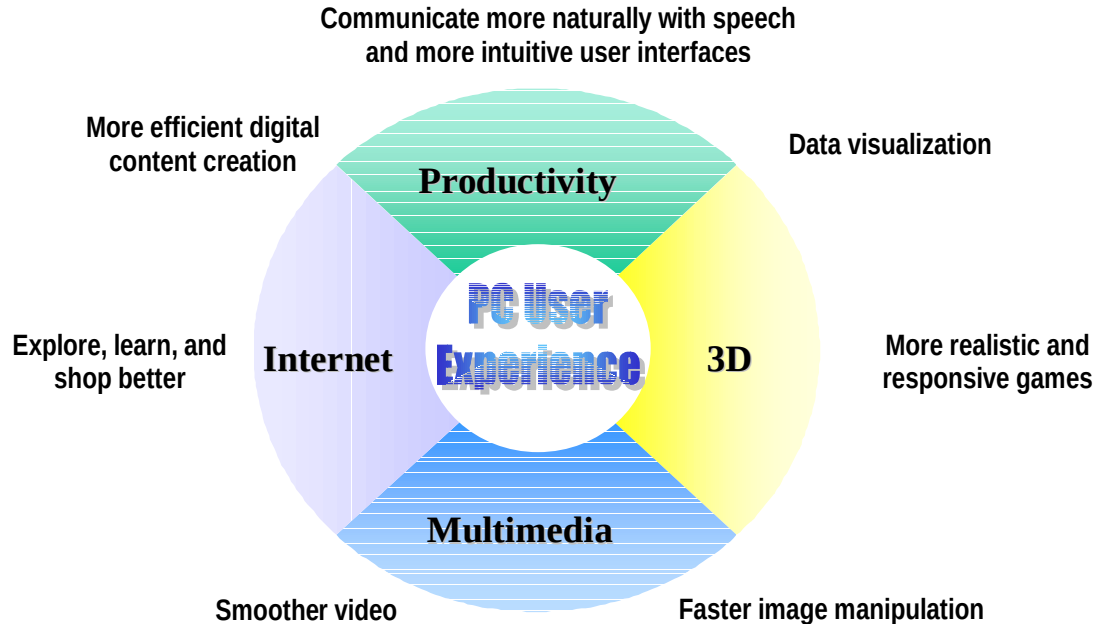

Figure 1. The Spectrum of Performance

On certain multimedia and 3D benchmarks, the Pentium III processor demonstrates substantial performance benefits. Compared with the Pentium II Processor 450MHz, for example, the Pentium III processor 450MHz shows a 29% performance improvement on MultimediaMark* 99, and a 74% improvement on the 3D Winbench* 99—3D Lighting and Transformation Test. The Pentium III processor 500MHz shows an even more substantial performance gain on these 3D and multimedia benchmarks, and delivers Intel's highest desktop performance on productivity and Internet applications.

Numerous developers are currently working on next-generation applications that will take Pentium III processor performance to new heights. As application-based benchmarks are updated to include these applications, and as synthetic benchmarks are updated to take advantage of new processor capabilities, these new benchmarks will highlight more prominently the performance increase of the Pentium III processor. Now is the time for system purchasers to invest in today's new standard for processor performance, while securing the capability for even more outstanding performance in the coming years.

This Performance Brief introduces the Pentium III processor, explains the technologies that make it work, examines the purpose and methods behind the industry's most useful benchmarks, and shows how the Pentium III processor currently performs on each. As new benchmarks are introduced, this performance brief will be updated appropriately.

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INTRODUCTION

The Pentium® III processor provides exceptional power for high-performance desktops and entry-level servers and workstations. It offers speed, compatibility, and reliability for today's productivity, multimedia, 3D, and Internet applications on today's operating systems. In addition, new multitasking, manageability, security, and architectural enhancements make the Pentium III processor the perfect choice for businesses preparing to enter the emerging Constant Computing Environment.

Today, the Intel® Pentium® III processor family consists of the following products:

- Pentium® III processor 500 MHz
- Pentium® III processor 450 MHz

When evaluating the performance of a microprocessor or system, it is important to obtain the complete performance picture. Today's PC user runs a broad spectrum of productivity, 3D, multimedia, and Internet software:

- Productivity software includes applications such as word processing, presentation, and personal finance programs.
- Multimedia software includes audio, video, imaging, and creativity applications.
- 3D software includes gaming, modeling, and simulation applications.
- Internet applications include Internet browsers, as well as 3D and multimedia Web content.

A processor and system should deliver the highest performance across the entire Spectrum of Performance: Productivity, Multimedia, 3D, and Internet.

This report provides benchmark results for the Intel® Pentium® III processor family. Modern, industry-standard benchmarks were chosen to demonstrate capabilities across the Spectrum of Performance:

- Productivity performance can be measured using processor-level productivity benchmarks such as Ziff-Davis'* CPUmark* 99 and system-level benchmarks such as BAPCO's SYSmark* 98.
- Multimedia performance can be compared with Futuremark's* MultimediaMark* 99 benchmark.
- 3D performance can be measured with the 3D Winbench* 99—3D Lighting and Transformation Test, 3DMark* 99 MAX—Synthetic CPU 3D Speed Test from Futuremark, as well as floating-point benchmarks such as Ziff-Davis' WinBench* 99—FPU WinMark*.
- Java aspects of the Internet experience can be measured by the Ziff-Davis* Jmark* 2.0 processor test.

Intel is committed to using the most robust and relevant benchmarks in characterizing the performance of its products, and will adapt this mix over time as newer benchmarks are introduced into the PC market.

System performance does not depend on the microprocessor alone. Hardware and software system components—such as the operating system, the graphics and I/0 subsystems, application software, and memory—may significantly affect benchmark results. For this reason, this Performance Brief illustrates Pentium® III processor performance on a consistent system configuration. Details of the system configuration used for the benchmarks throughout this brief can be found in Appendix A.

SPECTRUM OF PERFORMANCE

When evaluating the performance of a microprocessor or system, it is important to obtain the complete performance picture. A processor and system should deliver high performance across the entire Spectrum of Performance: Productivity, Multimedia, 3D, and Internet.

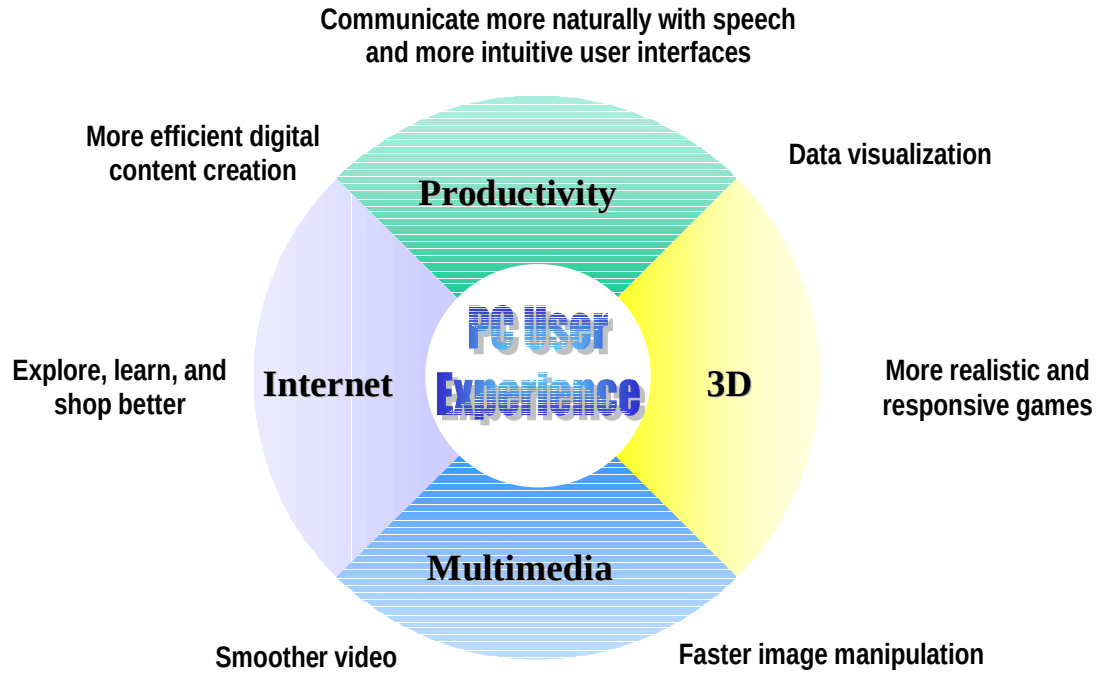

Figure 2. The Spectrum of Performance

Productivity Benchmarks

Productivity software includes applications such as word processing presentation, and personal finance. Popular, industry standard productivity benchmarks include:

Processor Level Benchmarks:

- CPUmark* 99
- Wintune* 98 Advanced CPU Integer Test
- SPECint*95

System Level Benchmarks:

- SYSmark* 98
- High End Winstone* 99
- Business Winstone* 99

Multimedia Benchmarks

Multimedia benchmarks are designed specifically to represent the activities of end users utilizing video, audio, and imaging technologies such as MPEG1, Dolby* Digital Sound, AVI, PC imaging, and video conferencing. A benchmark that falls under this category is:

- MultimediaMark* 99

3D Benchmarks/Floating-Point Benchmarks

The most common type of 3D application today is 3D games. Benchmarks that measure processor, 3D, and floating-point performance include:

- 3D Winbench* 99—3D Lighting and Transformation Test
- Futuremark* 3DMark* 99 MAX—Synthetic CPU 3D Speed Test
- WinBench* 99—FPU WinMark*
- SPECfp95*

Internet Technology Benchmarks

Internet applications are evolving at a tremendous rate and include browser, 3D, and multimedia technologies. In attempting to evaluate processor Internet performance, PC users should consult the productivity, 3D, and multimedia benchmarks listed above. Additionally, some Java Internet technology benchmarks are:

Processor Level Benchmarks:

- Jmark* 2.0 Processor Test

System Level Benchmarks:

- SYSmark* J

Evolving and Future Benchmarks

Benchmarks evolve as a direct response to the development of new technologies and the need to evaluate them objectively. As hardware and software technologies evolve, benchmarks must also evolve to capture new capabilities accurately.

The Pentium® III processor represents a major step in the evolution of computing potential. Currently available benchmarks show considerable gains across the Spectrum of Performance. Since applications that take full advantage of the Pentium III processor are in development, many of the existing benchmarks do not fully test the processor's new capabilities.

Currently, the 3D Winbench* 99—3D Lighting and Transformation Test, the 3DMark* 99 MAX—Synthetic CPU 3D Speed Test, and the MultimediaMark*99 benchmark take advantage of the capabilities of the Pentium III processor. As existing benchmarks are updated to support the new capabilities, and as new benchmarks are introduced, Intel will update this Performance Brief.

THE INTEL® PENTIUM® III PROCESSOR

The Intel® Pentium® III processor offers new levels of performance and productivity for today's most demanding applications and operating systems. It incorporates advanced features to take full advantage of the Wired for Management enterprise architecture and the Constant Computing Environment that will drive business productivity to new heights in the new century.

The Pentium III processor introduces Streaming SIMD Extensions that include 70 new instructions for dramatically faster processing and improved output on existing and next-generation applications across the entire Spectrum of Performance—including advanced imaging, 3D streaming audio and video, Web access, speech recognition, new user interfaces, and other cutting-edge applications.

Based on Intel's advanced 0.25 micron CMOS process technology, the processor core has over 9.5 million transistors. Introduced at 450 MHz and 500 MHz, the Pentium III processor also incorporates advanced features such as a 32K non-blocking level 1 cache and 512K non-blocking level 2 cache for fast access to priority data, memory cacheability for up to 4GB of addressable memory space, and scalability to dual-processing systems with up to 64GB of physical memory. A self-reportable processor serial number gives security, authentication, and system management applications a powerful new tool for identifying individual systems.

Pentium III processors are available in Intel's Single Edge Contact Cartridge 2 (S.E.C.C.2) form factor for high-volume availability, improved handling protection, and compatibility with the high-performance processors of the future. Compatibility with the widely deployed 400BX AGPset platform also ensures compatibility with existing systems and a short qualification cycle for maximum return on investment.

The Pentium III processor is backed by over 25 years of Intel experience in manufacturing high-quality, reliable microprocessors.

INTEL® PENTIUM® III PROCESSOR PRODUCT FEATURE HIGHLIGHTS

The Pentium® III processor is fully compatible with an entire library of PC software based on operating systems such as MS-DOS*, Windows* 3.1, Windows for Workgroups* 3.11, Windows* 98, Windows* 95, OS/2*, UnixWare*, SCO UNIX*, Windows* NT, OPENSTEP*, and Sun Solaris*. Architectural features of the Pentium III processor include:

- Streaming SIMD Extensions:
  The Streaming SIMD Extensions consist of 70 new instructions, including single instruction multiple data floating-point, additional SIMD integer, and cacheability control instructions. Some of the technologies that benefit from the Streaming SIMD Extensions include advanced imaging, 3D, streaming audio and video, and speech recognition applications. Benefits include:
  - ⇒ Higher resolution and higher quality image viewing and manipulation
  - ⇒ High quality audio, MPEG2* video, and simultaneous MPEG2 encoding and decoding
  - ⇒ Reduced CPU utilization for speech recognition, as well as higher accuracy and faster response times

- Intel Processor Serial Number:
  The processor serial number, the first of Intel's planned building blocks for PC security, serves as an electronic serial number for the processor and, by extension, its system or user, enabling the system/user to be identified by networks and applications. The processor serial number will be used in applications that benefit from stronger forms of system and user identification, such as the following:
  - ⇒ Applications using security capabilities: Managed access to new Internet content and services; electronic document exchange
  - ⇒ Manageability applications: Asset management; remote system load and configuration

- Intel MMX™ Media Enhancement Technology:
  Intel MMX technology is designed as a set of 57 basic, general-purpose integer instructions and four data types that are easily applied to the needs of a wide diversity of multimedia and communications applications. Highlights of the technology include:
  - ⇒ Single Instruction, Multiple Data (SIMD) technique
  - ⇒ Eight 64-bit wide MMX technology registers

- Dynamic Execution Technology:
  - ⇒ Multiple branch prediction: Predicts program execution through several branches, thereby accelerating the flow of work to the processor
  - ⇒ Dataflow analysis: Creates an optimized, reordered schedule of instructions by analyzing data dependencies between instructions
  - ⇒ Speculative execution: Carries out instructions speculatively, and based on this optimized schedule, ensures that the processor's superscalar execution units remain busy, thereby boosting overall performance

- Testing and Performance Monitoring Features:
  - ⇒ Built-in Self Test (BIST) provides single stuck-at fault coverage of the microcode and large logic arrays, as well as testing of the instruction cache, data cache, Translation Lookaside Buffers (TLBs), and ROMs.
  - ⇒ IEEE 1149.1 Standard Test Access Port and Boundary Scan mechanism enables testing of the Pentium® III processor and system connections through a standard interface.
  - ⇒ Internal performance counters can be used for performance monitoring and event counting.
  - ⇒ Incorporates an on-die diode that can be used to monitor the die temperature. A thermal sensor located on the motherboard can monitor the die temperature of the Pentium® III processor for thermal management purposes.

- Other significant features of the Pentium® III processor include:
  - ⇒ S.E.C.C.2. packaging, developed by Intel, enables high-volume availability, improved handling protection, and a common form factor for compatibility with future high-performance processors.
  - ⇒ High-performance Dual Independent Bus (DIB) architecture (system bus and cache bus) provides high bandwidth, performance, and scalability with future system technologies.
  - ⇒ The system bus supports multiple outstanding transactions to increase bandwidth availability. It also provides “glueless” support for up to two processors. This enables low-cost, two-way symmetric multiprocessing, providing a significant performance boost for multitasking operating systems and multithreaded applications.
  - ⇒ A 512K unified, non-blocking, level-two (L2) cache improves performance by reducing the average memory access time and by providing fast access to recently used instructions and data. Performance is enhanced through a dedicated 64-bit cache bus. The speed of the L2 cache scales with the processor core frequency. This processor also incorporates separate 16K level-one caches, one for instructions and one for data.
  - ⇒ Both the 500 and 450 MHz Pentium® III processors support memory cacheability for up to 4 GB of addressable memory space.
  - ⇒ The processor is available with Error Correction Code (ECC) functionality on the level-two cache bus for applications where data intensity and reliability are essential.
  - ⇒ A pipelined Floating-Point Unit (FPU) supports the 32-bit and 64-bit formats specified in IEEE standard 754 as well as an 80-bit format.
  - ⇒ Parity-protected address/request and response system bus signals with a retry mechanism ensure high data integrity and reliability.

iCOMP® INDEX 3.0

The iCOMP® Index provides a simple, relative measure of microprocessor performance. It is not a benchmark, but a collection of benchmarks used to calculate an index of relative performance that can help PC purchasers decide which Intel microprocessor best meets their computing needs. The iCOMP Index 3.0 comprehends:

1. **Development of new or updated benchmarks.** The PC industry updates existing benchmarks, or develops new benchmarks, to reflect the unique mix of instructions for existing and emerging software.
2. **Increasing use of 3D, multimedia, and Internet technology and software.** Another trend incorporated into the new formula is the increasing use of 3D, multimedia, and Internet technology and software.

The iCOMP Index 3.0 ratings cannot be compared with earlier versions of the iCOMP index because different benchmarks and weightings are used.

The iCOMP Index 3.0 rating is based on the Spectrum of Performance. A higher iCOMP rating indicates higher relative performance of an Intel microprocessor.

Figure 3 illustrates the iCOMP Index 3.0 ratings for Intel performance microprocessors. System configurations used in iCOMP Index 3.0 measurements are listed in Appendix B.

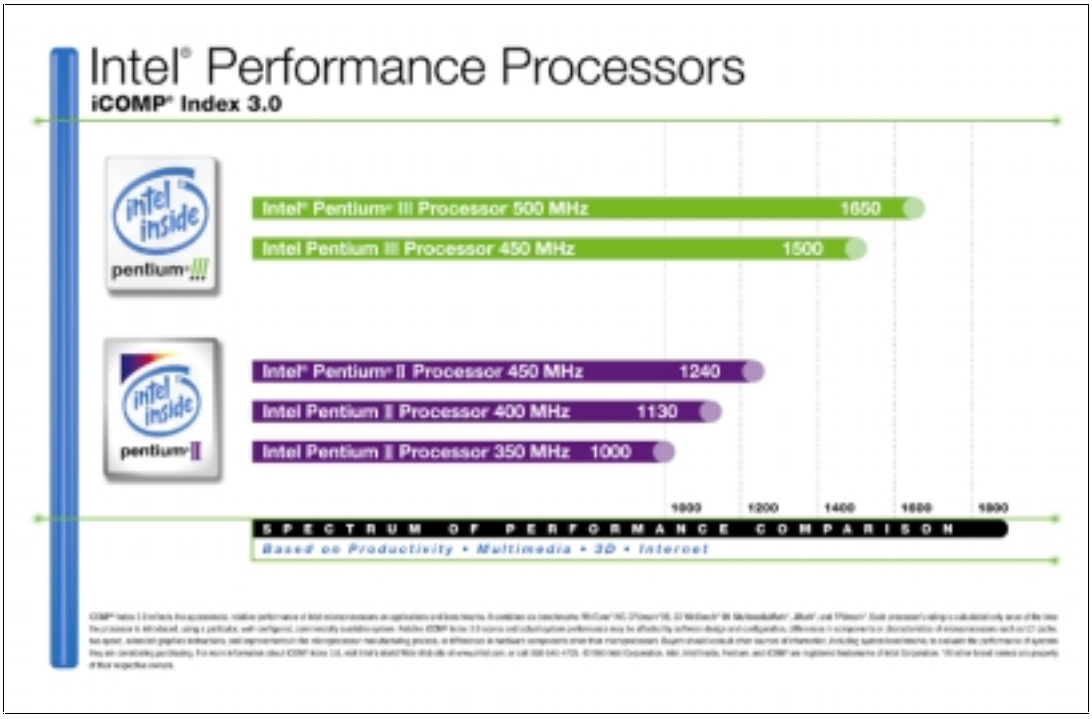

Figure 3. iCOMP® Index 3.0 Ratings for Pentium® II and Pentium III Processors (System configuration for iCOMP Index 3.0 components is given in Appendix B)

iCOMP® Index 3.0 reflects the approximate, relative performance of Intel microprocessors on applications and benchmarks. It combines six benchmarks: WinTune* 98 Advanced CPU Integer test, CPUmark* 99, 3D WinBench* 99—CPU Lighting and Transformation Test, MultimediaMark* 99, Jmark* 2.0 Processor Test, and WinBench* 99—FPU WinMark*.

Each processor's rating is calculated only once at the time the processor is introduced, using a particular, well-configured, commercially available system. Relative iCOMP Index 3.0 scores and actual system performance may be affected by software design and configuration, differences in components or characteristics of microprocessors such as L2 cache, bus speed, extended graphics instructions, and improvements in the microprocessor manufacturing process, or differences in hardware components other than microprocessors.

Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing. For more information about iCOMP Index 3.0, visit Intel's World Wide Web site at www.intel.com, or call 800-548-4725.

MICROPROCESSOR PERFORMANCE SUMMARY

Productivity Benchmarks

Processor Level Benchmarks

CPUmark* 99

Ziff-Davis*' CPUmark* 99 is a Windows benchmark that measures the performance of a PC processor, its internal cache (both level one and/or level two), external cache, and system RAM.

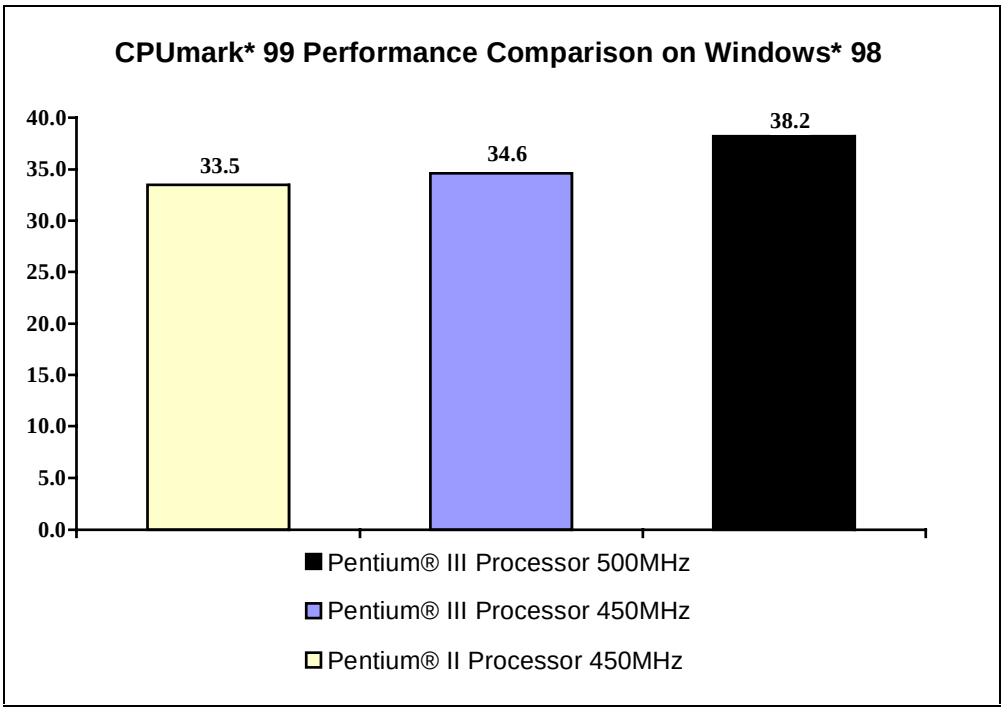

Figure 4. Intel® Pentium® III Processor Performance for the Ziff-Davis* CPUmark* 99 Benchmark

Wintune* 98 Advanced CPU Integer Test

Wintune* 98 is a diagnostic testing and benchmark program for Windows* 98, Windows 95 and Windows NT systems. It performs a series of seven tests, including CPU, memory, video, and disk speed tests. Test results can be compared to results from similar machines, through a central database maintained by Windows Magazine on the Internet.

The Wintune 98 Advanced CPU Integer test concentrates on the productivity performance of the CPU. In addition, this test stresses the CPU memory cache to reflect the performance of real world applications. Results of this test are most applicable to word processing, spreadsheet, and other productivity applications.

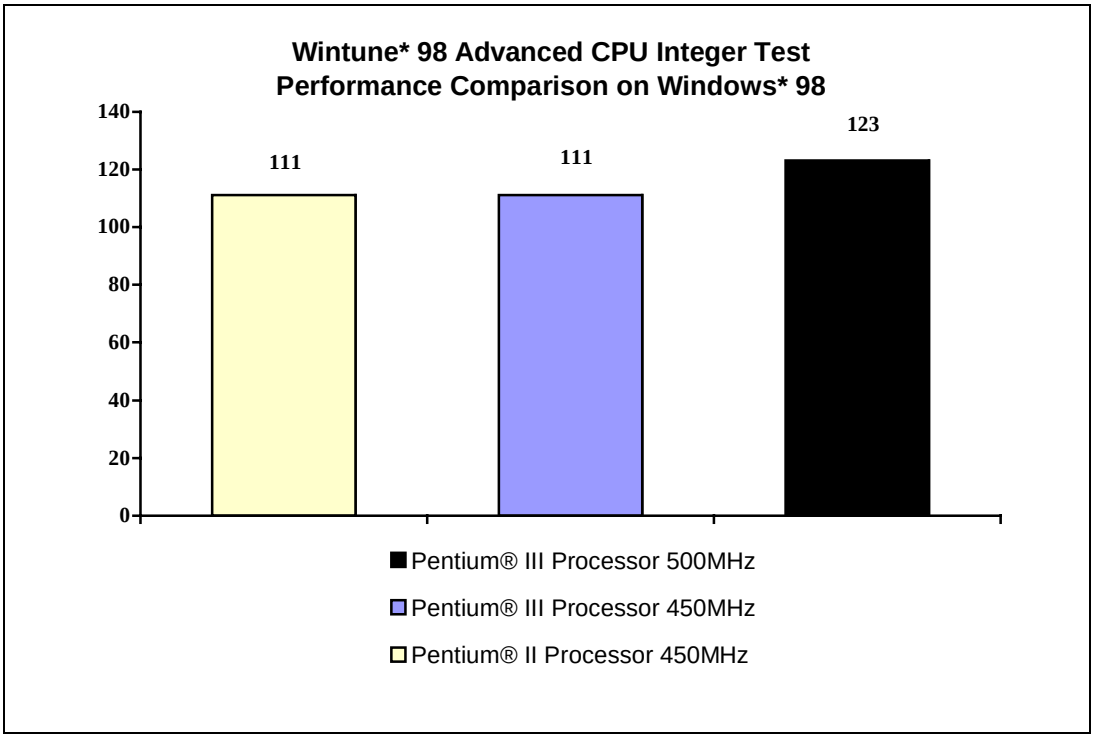

Figure 5. Intel® Pentium® III Processor Performance for the Wintune* 98 Advanced CPU Integer Test

SPECint95*

SPEC CPU*95 is a software benchmark product that can be run on Windows* NT and many varieties of UNIX*. SPEC CPU95 is produced by the Standard Performance Evaluation Corp. (SPEC), a non-profit group of computer vendors, system integrators, universities, research organizations, publishers, and consultants throughout the world. It was designed to provide comparisons of performance for compute-intensive workloads on different computer systems.

SPEC CPU*95 consists of two suites of benchmarks: SPECint95* for measuring and comparing compute-intensive integer performance, and SPECfp95 for measuring and comparing compute-intensive floating-point performance. The two suites provide component-level benchmarks that measure the performance of the computer's processor, memory architecture, and compiler. SPEC benchmarks are selected from existing application and benchmark source code running across multiple platforms.

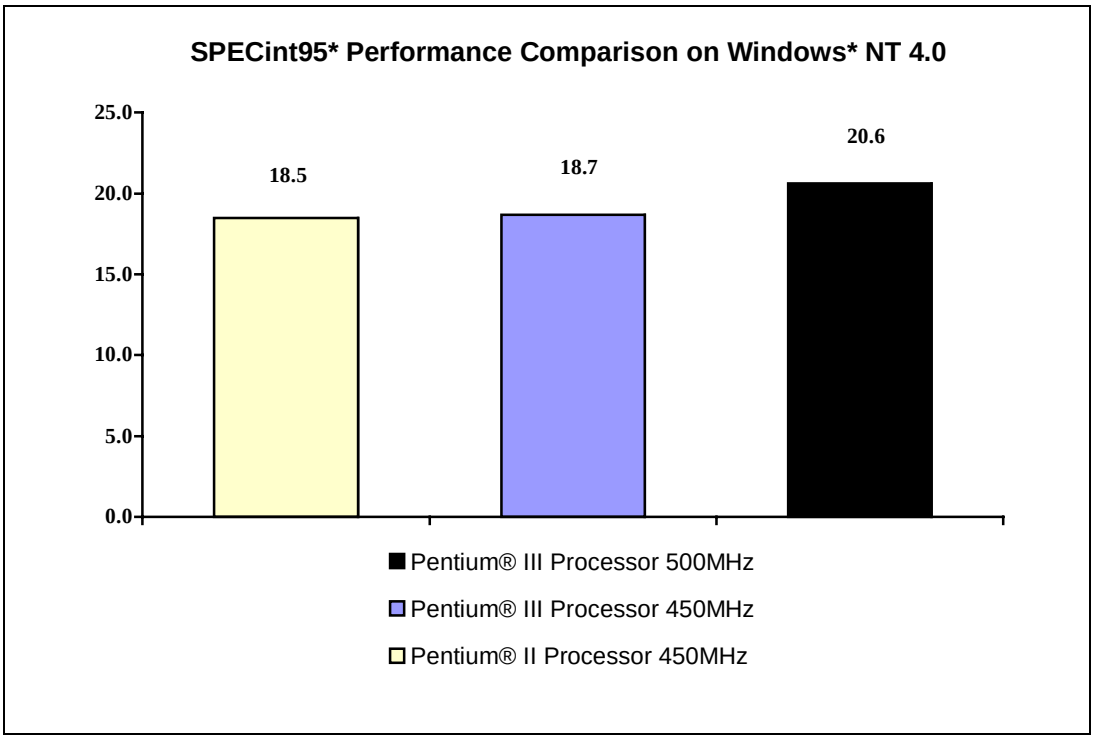

Figure 6. Intel® Pentium® III Processor Performance for the SPECint95* Benchmark

SYSmark* 98 For Windows 98 & NT 4.0

SYSmark* 98 for Windows* 98 and NT 4.0 is a suite of application software and associated benchmark scripts developed by the Business Applications Performance Corporation (BAPCO), a non-profit consortium of PC OEMs, software vendors, semiconductor manufacturers, and industry publications. SYSmark 98 is a tool that measures system performance on popular business-oriented applications in the Microsoft* Windows operating environment. The scripts were developed to reflect usage patterns of PC users in a business-oriented environment.

SYSmark* 98 includes 32-bit benchmark scripts for the following categories and applications:

Office Productivity:
- Corel* CorelDRAW* 8
- Microsoft Excel* 97
- Dragon Systems* Naturally Speaking* 2.02
- Netscape* Communicator* 4.05
- Caere* OmniPage Pro* 8.0
- Corel Paradox* 8.0
- Microsoft PowerPoint* 97
- Microsoft Word* 97

Content Creation:
- MetaCreations* Bryce* 2
- Avid* Elastic Reality* 3.1
- Macromedia* Extreme3D * 2
- Adobe* Photoshop* 4.0.1
- Adobe Premiere* 4.2
- Xing Technology* XingMPEG* Encoder* 2.1

Figure 7 and Figure 8 illustrate the SYSmark* 98 rating under Windows* 98 and NT 4.0 for the Pentium® III processor.

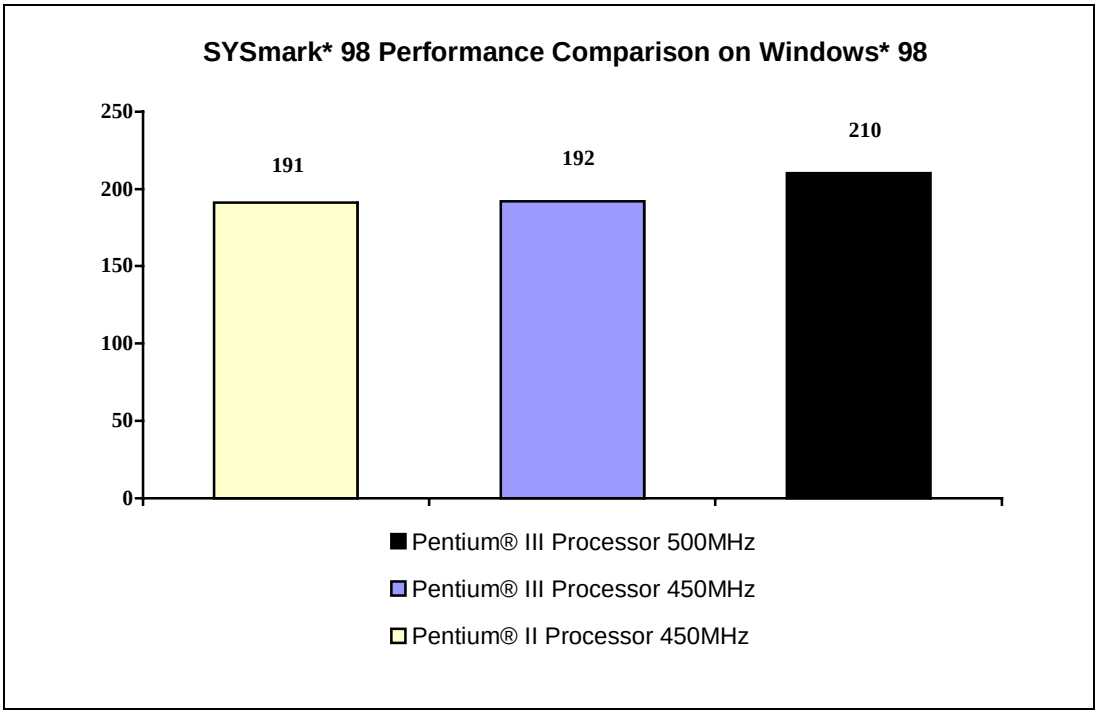

Figure 7. Intel®Pentium® III Processor Performance for SYSmark* 98 on Windows* 98

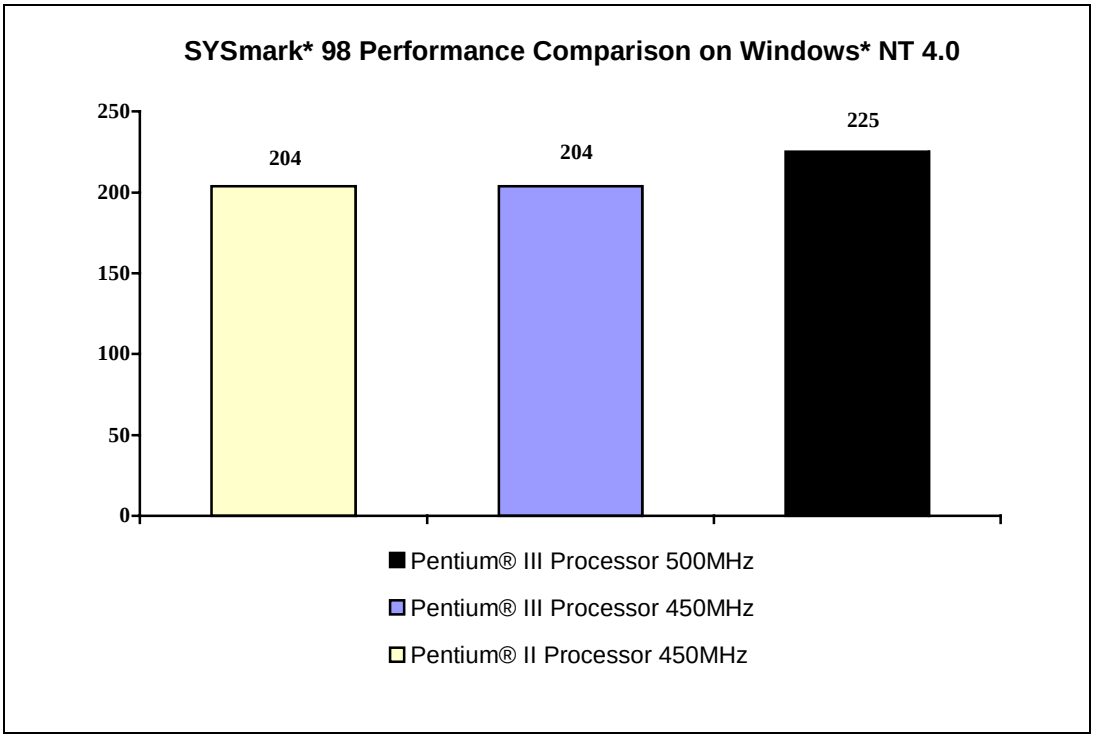

Figure 8. Intel® Pentium® III Processor Performance for SYSmark* 98 on Windows* NT 4.0

Winstone* 99

Winstone* 99 is a system-level, application-based benchmark developed by Ziff-Davis*. Winstone 99 measures a PC's overall performance when running Windows-based 32-bit applications on Windows 98 or Windows NT 4.0. It runs actual 32-bit business suites through a series of scripted activities and uses the time a PC takes to complete those activities to produce its performance scores.

Business Winstone 99 incorporates the following popular office software suites: Corel WordPerfect* Suite 8, Lotus* SmartSuite*, and Microsoft Office* 97. To mirror the typical usage patterns of today's PC users, the benchmark keeps multiple applications open within each suite, and switches tasks between these applications and the Netscape Navigator Internet browser.

Unlike Business Winstone 99, the applications in High End Winstone 99 are not grouped into suites. This benchmark includes the following applications: Adobe Photoshop* 4, Adobe Premiere* 4.2, AVS/Express* 3.4, Microsoft FrontPage* 98, Microsoft Visual C++ 5.0, Sound Forge* 4.0 and MicroStation* SE.

Figure 9 and Figure 10 illustrate the results for High End Winstone* 99 for Windows* NT 4.0 and Business Winstone 99 for Windows 98, respectively.

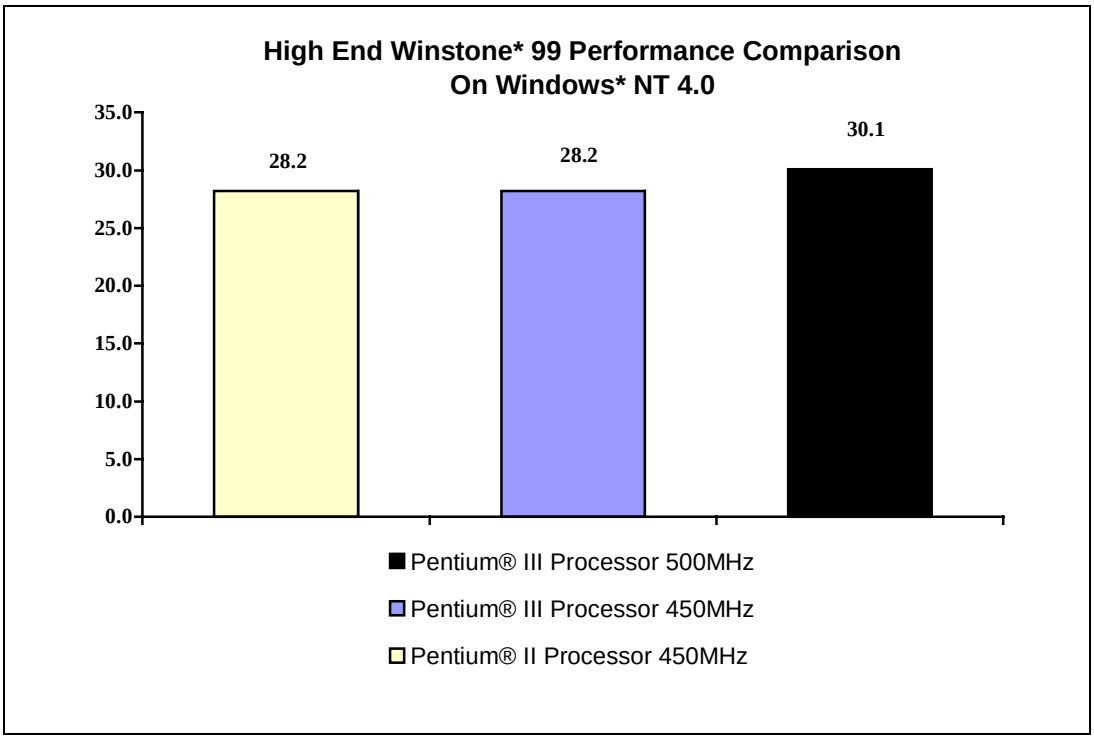

Figure 9. Intel® Pentium® III Processor Performance for High End Winstone* 99

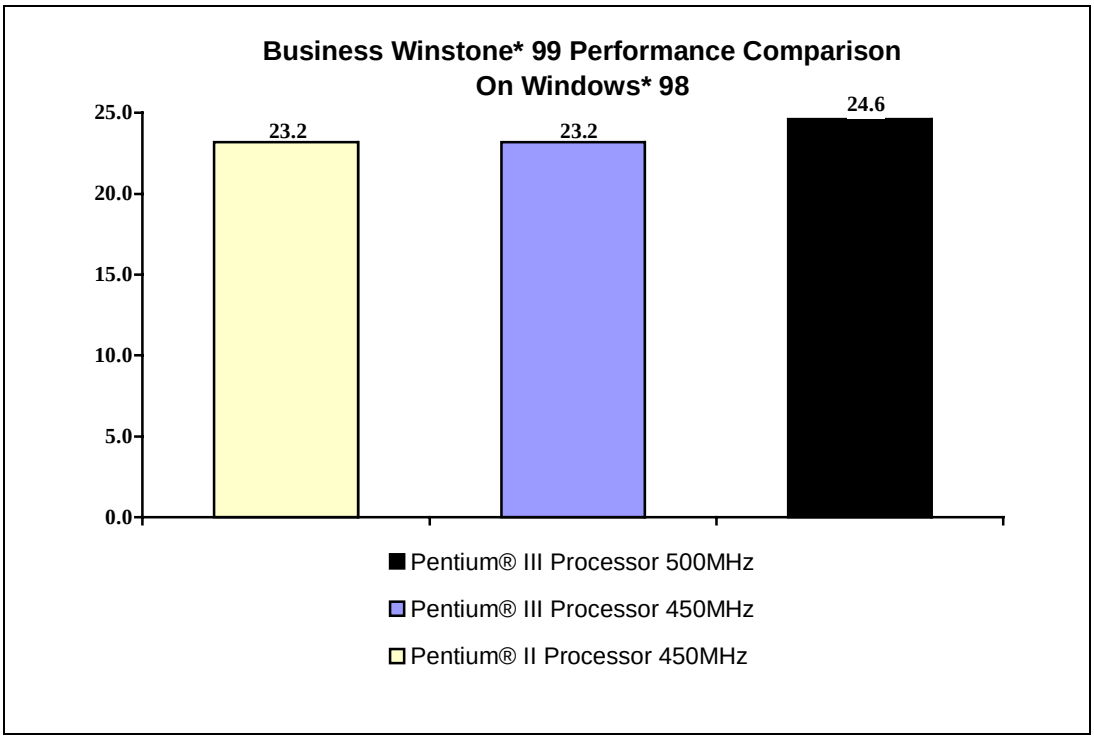

Figure 10. Intel® Pentium® III Processor Performance for Business Winstone* 99

Multimedia Benchmarks

MultimediaMark* 99

MultimediaMark* 99 is a benchmark application suite by Futuremark* Corporation. It focuses on testing multimedia performance of a modern PC in a “real world” environment. The components of MultimediaMark 99 include MPEG-1* video encoding, MPEG-1 video playback, image processing, and audio effects.

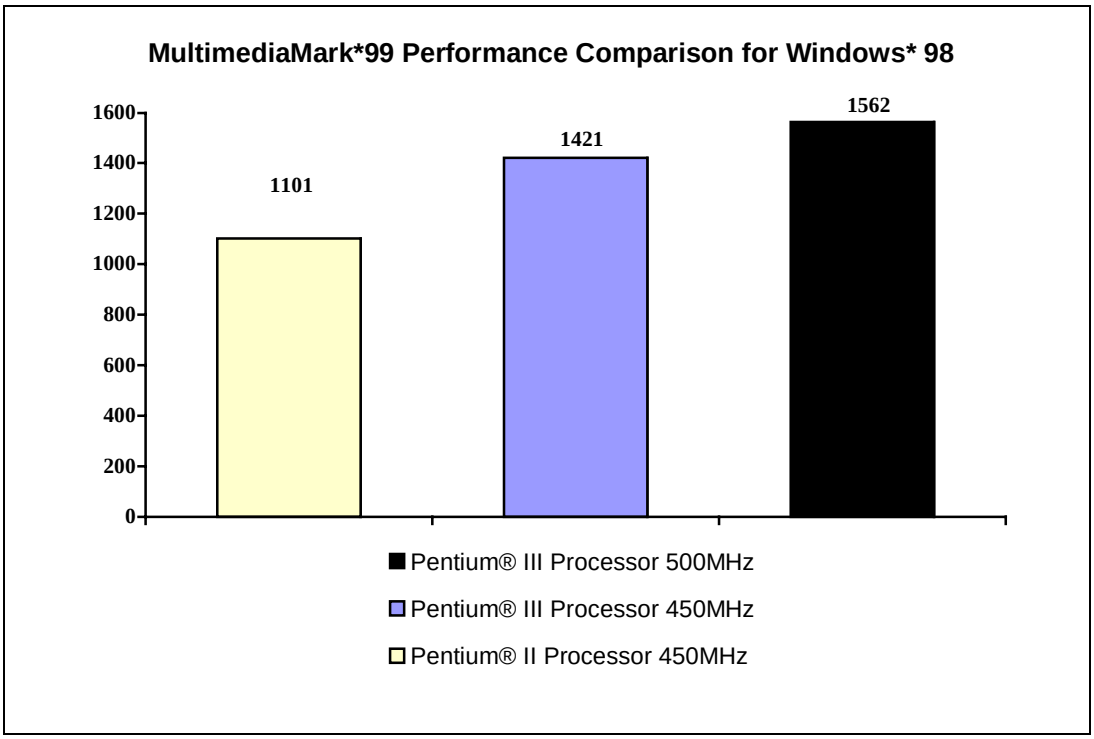

Figure 11. Intel ®Pentium® III Processor Performance for the MultimediaMark* 99 Benchmark

3D Benchmarks/Floating-Point Benchmarks

3D Winbench* 99—3D Lighting and Transformation Test

3D Winbench* 99 measures system-level 3D performance including CPU and graphics subsystem performance. To understand the processor 3D performance, the benchmark suite includes the 3D WinBench 99—3D Lighting and Transformation Test. This benchmark measures the CPU intensive portion of the 3D graphics pipeline.

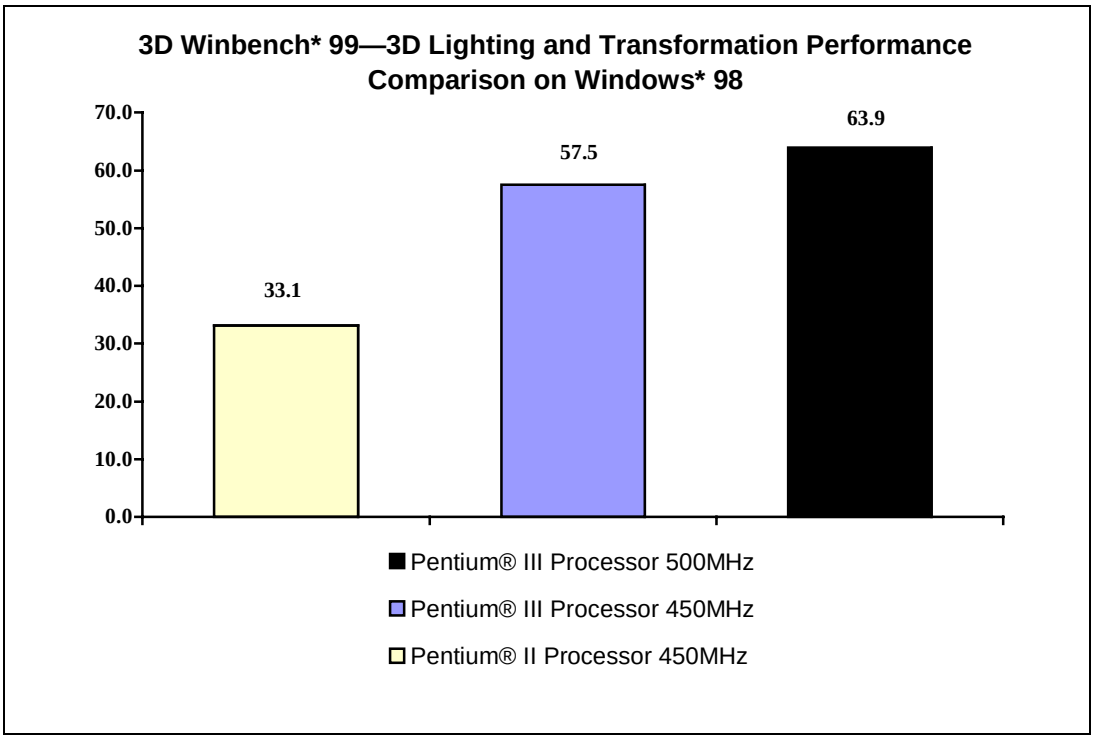

Figure 12. Intel® Pentium® III Processor Performance for the 3D Winbench* 99—3D Lighting and Transformation Test

3DMark* 99 MAX—Synthetic CPU 3D Speed Test

3DMark* 99 MAX from Futuremark* is a diagnostic suite of benchmarks, based on current 3D games and high-end applications, that analyzes, tests, and reports on a system's 3D performance. For processor comparisons, 3DMark 99 MAX includes the Synthetic CPU 3D Speed Test. This test focuses on the floating-point-intensive 3D geometry portion of the graphics pipeline.

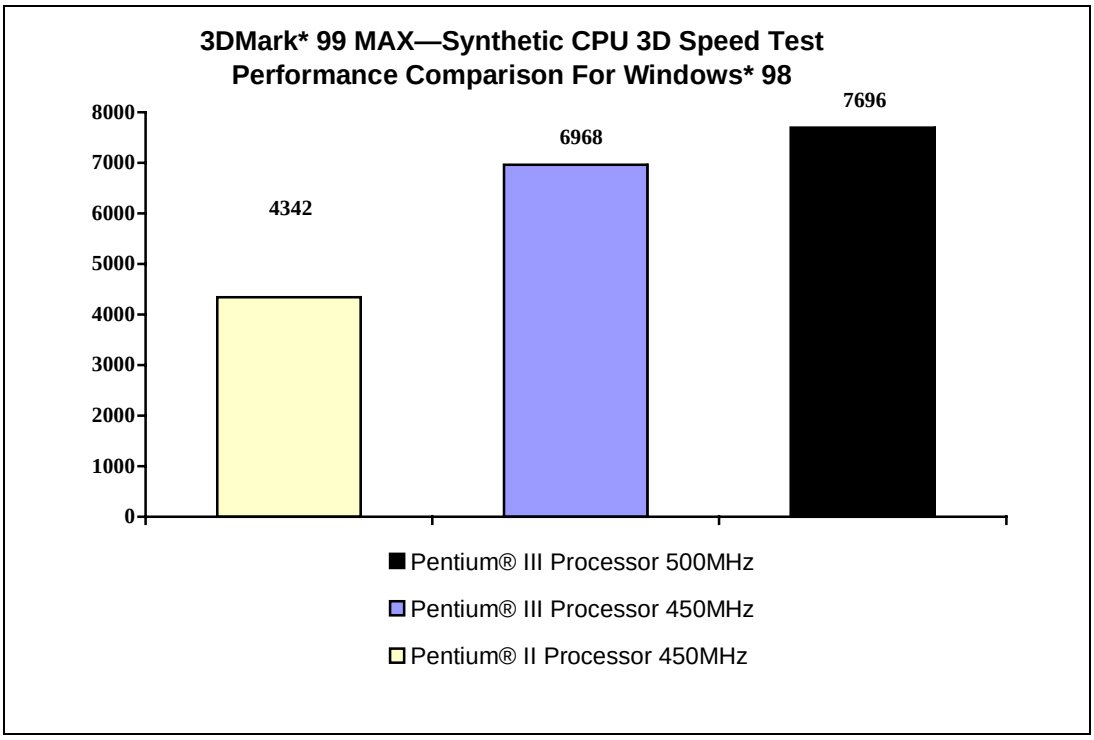

Figure 13. Intel® Pentium® III Processor Performance for the 3DMark* 99 MAX—Synthetic CPU 3D Speed Test

WinBench* 99—FPU WinMark*

The WinBench* 99—FPU WinMark* benchmark measures the performance of the processor floating-point subsystem, which is used for such tasks as 3D graphics rendering and scientific calculations. This synthetic benchmark was developed by Ziff-Davis*. The test consists of five algorithms: 3D graphics operations, fast Fourier transforms (FFT), calculation of planetary orbitals, calculation of areas of polygons, and Gauss-Jordan elimination of a coefficient matrix of linear equations. The benchmark reports a single score based on the weightings that Ziff-Davis has assigned to the component algorithms.

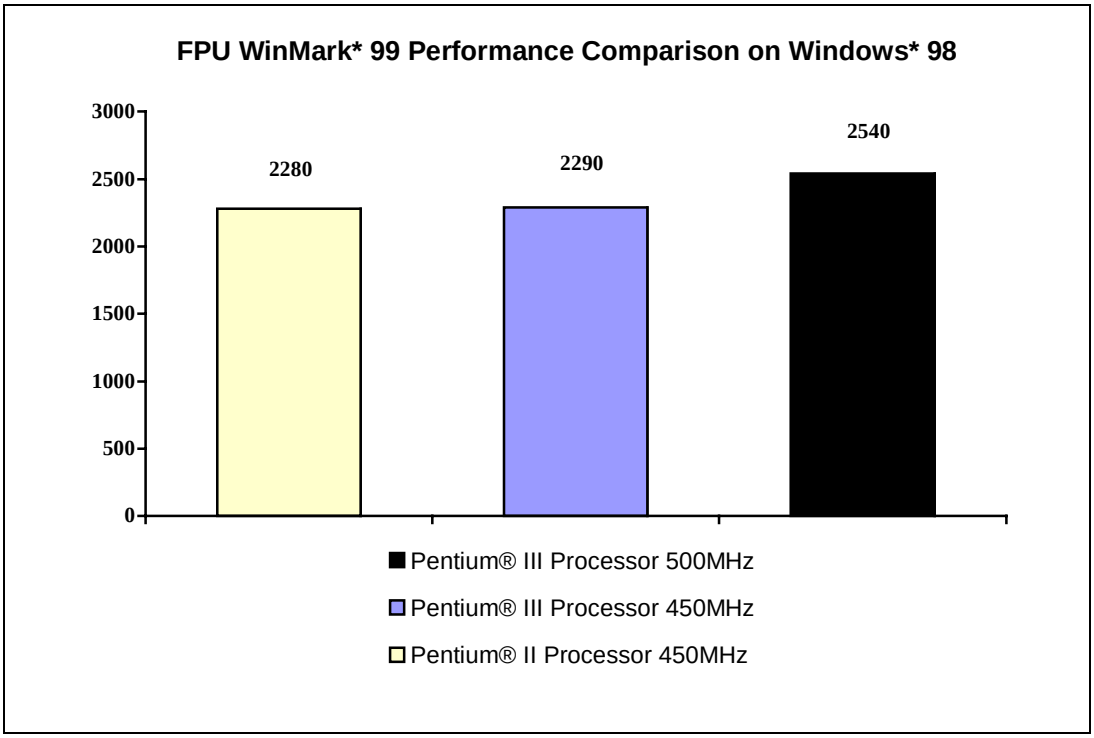

Figure 14. Intel® Pentium® III Processor Performance for the WinBench* 99—FPU WinMark* Benchmark

SPECfp95*

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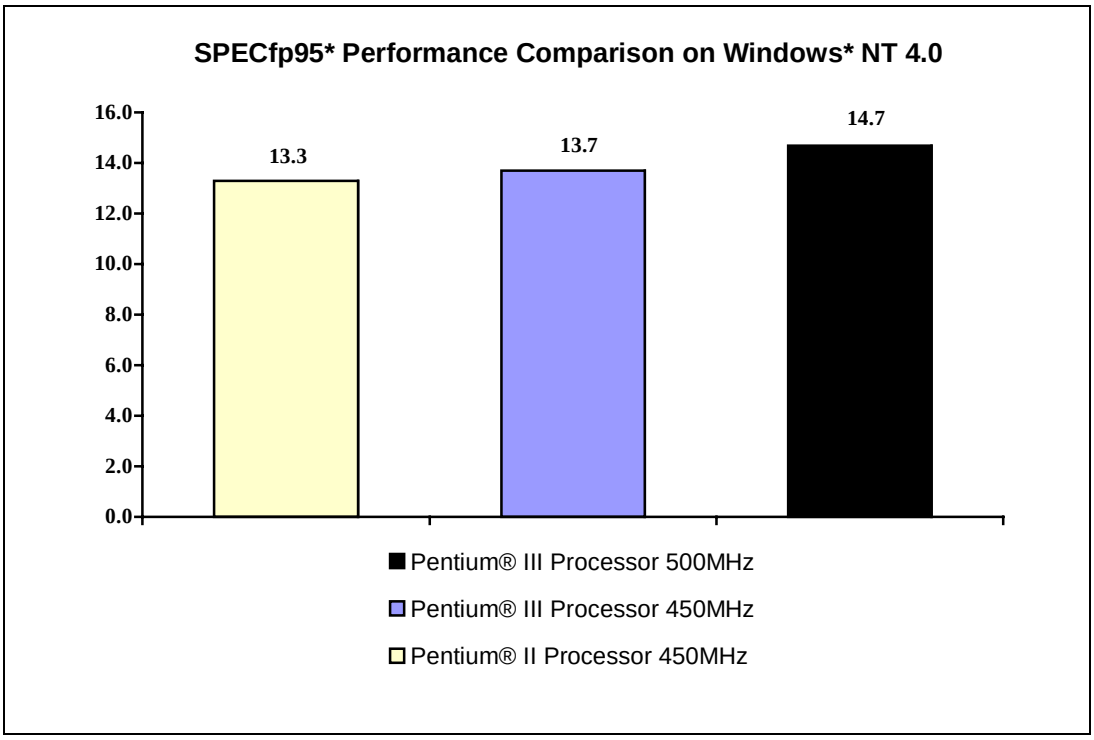

Figure 15. Intel® Pentium® III Processor Performance for the SPECfp95* Benchmark

Internet Technology Benchmarks

JMark* 2.0 Processor Test

Jmark* 2.0 is a benchmark developed by Ziff-Davis* to measure processor Java performance. The Jmark 2.0 Processor Test stresses the Java Virtual Machine (JVM) on a non-graphical workload.

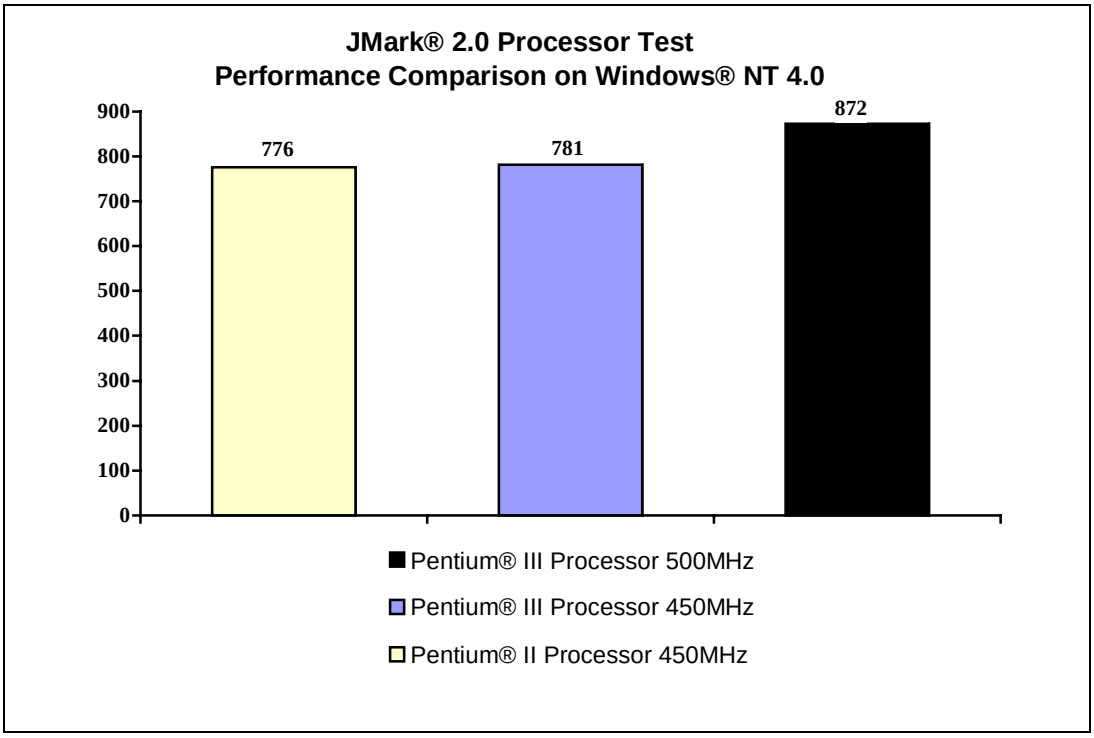

Figure 16. Intel® Pentium® III Processor Performance for the Ziff-Davis* Jmark* 2.0 Processor Test

SYSmark* J

SYSmark* J is a Java benchmark suite designed and developed by the Business Applications Performance Corporation (BAPCO). It allows performance comparisons across platforms that support Java Development Kit Version 1.1 (JDK1.1). SYSmark* J is a collection of 4 applications covering word processing, spreadsheet, image processing, and multimedia.

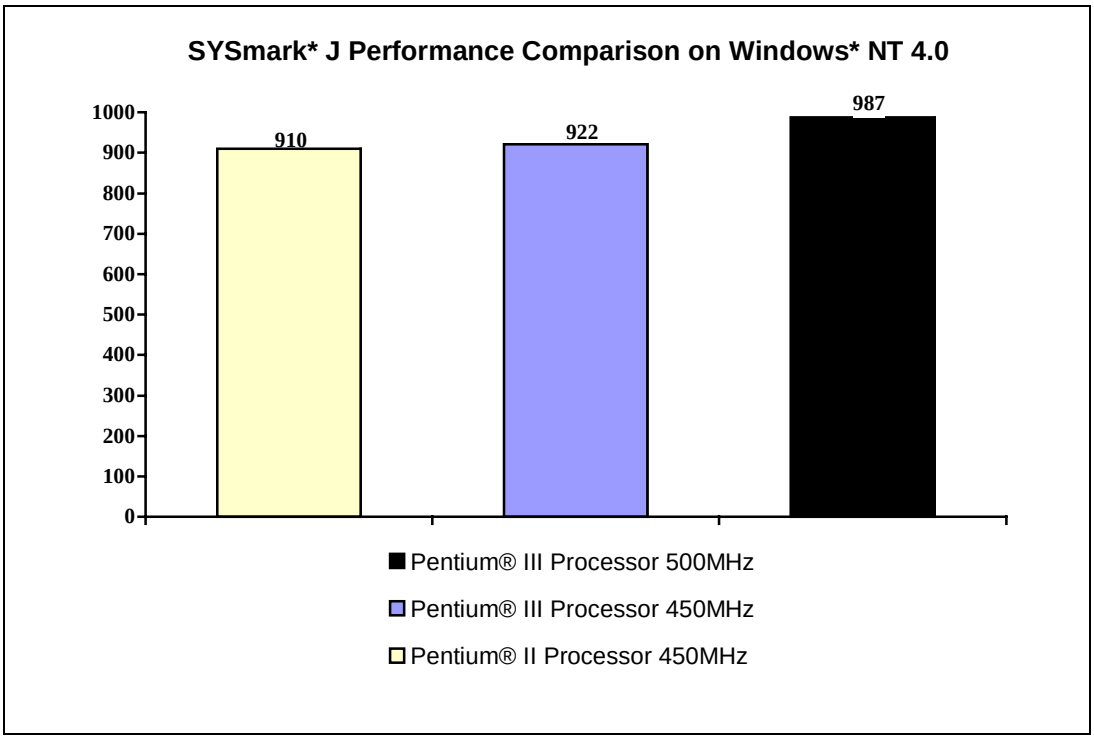

Figure 17. Intel® Pentium® III Processor Performance for SYSmark* J

SUMMARY

Table 1 summarizes the iCOMP® Index 3.0 performance for the Intel® Pentium® III processor. A higher score indicates better performance.)

Table 1. iCOMP® Index 3.0 Results

Pentium® III processor 500MHz	Pentium® III processor 450MHz	Pentium® II processor 450MHz	Pentium® II processor 400MHz	Pentium® II processor 350MHz
1650	1500	1240	1130	1000

Table 2 summarizes productivity benchmark performance for the Intel Pentium III processor. A higher score indicates better performance.

Table 2. Spectrum of Performance Benchmark Results—Productivity Benchmarks

	Pentium® III processor 500MHz	Pentium® III processor 450MHz	Pentium® II processor 450MHz
SYSmark* 98—Win*98	210	192	191
Business Winstone* 99—Win*98	24.6	23.2	23.2
SYSmark*98—NT 4.0	225	204	204
Business Winstone *99—NT 4.0	33.5	31.5	31.4
High End Winstone* 99—NT 4.0	30.1	28.2	28.2
CPUmark* 99—Win*98	38.2	34.6	33.5
Wintune* 98 Advanced CPU Integer Test—Win98	123	111	111
SPECint95*—NT 4.0	20.6	18.7	18.5
SPECint_base95*—NT 4.0	20.6	18.7	18.5

Table 3 summarizes multimedia benchmark performance for the Intel® Pentium® III processor. A higher score indicates better performance.

Table 3. Spectrum of Performance Benchmark Results—Multimedia Benchmarks

	Pentium® III processor 500MHz	Pentium® III processor 450MHz	Pentium® II processor 450MHz
MultimediaMark* 99—Win*98	1562	1421	1101

Table 4 summarizes 3D/floating-point benchmark performance for the Intel® Pentium® III processor. A higher score indicates better performance.

Table 4. Spectrum of Performance Benchmark Results—3D Benchmarks/Floating-Point Benchmarks

	Pentium® III processor 500MHz	Pentium® III processor 450MHz	Pentium® II processor 450MHz
3D WB99/3D Processing (Lighting & Transformation)—Win98	63.9	57.5	33.1
WinBench* 99—FPU WinMark* —Win98	2540	2290	2280
3DMark* 99 MAX—Synthetic CPU 3D Speed Test—Win*98	7696	6968	4342
SPECfp_base95*—NT 4.0	13.2	12.3	11.9
SPECfp95*—NT 4.0	14.7	13.7	13.3

Table 5 summarizes Internet benchmark performance for the Intel Pentium III processor. A higher score indicates better performance.

Table 5. Spectrum of Performance Benchmark Results—Internet Technology Benchmarks

	Pentium® III processor 500MHz	Pentium® III processor 450MHz	Pentium® II processor 450MHz
Jmark* 2.0 Processor Test—NT 4.0	872	781	776
SYSmark* J—NT 4.0	987	922	910

APPENDIX A — TEST CONFIGURATIONS

Table 6. System Configuration Used in Benchmark Tests

Processor	**Pentium® II Processor 450MHz, Pentium III Processor 450, 500 MHz**
System	Intel® SE440BX-2 motherboard
FPU	Integrated
Secondary Cache	512KB
Memory Size	128 MB SDRAM 100MHz
Hard Disk Controller/Bus	Adaptec* AHA2940UW2W SCSI/PCI
Hard Disk	Seagate Cheetah* ST39102LW
Video Controller/Bus	Diamond Multimedia Viper* V550 AGP
Video Memory Size/Type	16MB SGRAM
Operating System 1	**Windows* 98 - Build 1998**
Video Driver Revision	4.10.01.0239
Graphics	1024x768 Resolution, 16bit Color
Operating System 2	**Windows* NT 4.0 - Build 1381 w/service pack 4**
Video Driver Revision	4.00.1381.203, 4.00
Graphics	1024x768 Resolution, 16 bit color
CD ROM Drive	Toshiba* 32X XM-6201B SCSI
Sound Card	Diamond MonsterSound* M80 PCI
C Compiler	Intel C/C++* Compiler Plug-in V4.0 Microsoft Visual C/C++ 6.0 (for libraries)
FORTRAN Compiler	Intel FORTRAN Compiler Plug-in V2.4
Browser	Internet Explorer* V4.72.3110 Updated With SP1,3283

APPENDIX B — iCOMP® INDEX CONFIGURATION

Table 7. System Configuration Used for iCOMP® Index 3.0 Ratings

Processor	**Pentium® II Processor 450MHz, Pentium III Processor 450, 500 MHz**
FPU	Integrated
System	Intel® SE440BX-2
Secondary Cache	512KB
Hard Disk	Adaptec* AHA2940UW2W SCSI/PCI, Seagate Cheetah ST39102LW
Video	Diamond Multimedia Viper* V550 AGP (w/ 16MB SDRAM); Driver: 4.10.01.0239
Audio	Diamond MonsterSound* M80 PCI
Operating System	**Windows*98 with Microsoft DirectX 6.1***
Memory Size	128 MB SDRAM
Graphics	1024x768 Resolution, 16-bit color

iCOMP® Index 3.0 Component Scores As Measured On Appendix B Configurations

Table 8. iCOMP® Index 3.0 Component scores on Appendix B Configurations

Processor (All on Windows* 98)	Pentium® III Processor 500 MHz	Pentium® III Processor 450 MHz	Pentium® II Processor 450 MHz
iCOMP® Index 3.0 Rating	**1650**	**1500**	**1240**
Wintune*98 Advanced CPU Integer Test	123.03	110.78	110.78
CPUmark* 99	38.2	34.6	33.5
MultimediaMark* 99	1562	1421	1101
FPU WinMark*99	2540	2290	2280
3D WB99 Lighting & Transformation	63.9	57.5	33.1
Jmark* 2.0 Processor Test	845	780	751